

Two epidemiologists dis

By David Woods

The Michigan Heart Association has invented a game — called Risko. The idea is that "players" tot up scores for such coronary risk factors as age, heredity, diet, smoking and exercise habits. If their probability rating is high they are supposed (shades of Do Not Pass Go; Do Not Collect \$200) to march straight into the office of their local physician.

Risko, while undoubtedly well intentioned, is another in a long line of efforts to pay some kind of lip service — one thinks of the warnings on cigarette packs — to preventive medicine. People who score high on Risko, says Toronto physician W. Harding LeRiche, might be scared to go to a physician; worse still, they might rush out and do two mornings of strenuous and highly dangerous jogging. The trouble is, LeRiche points out, that many of the people who go to physicians for preventive care may be "fusspots" or "hypochondriacs."

LeRiche, head of the department of epidemiology and biometrics at the University of Toronto's school of hygiene, is the author of a successful book, "Epidemiology as Medical Ecology." He is an articulate and engaging spokesman for preventive medicine, not least because he sees it as being inextricably interwoven with politics. He also believes that preventive medicine, like charity, should begin at home — but usually doesn't.

"The consumer," he says, "isn't interested in doing anything for his health that requires discipline, like eating less or exercising more; he wants to do things that are passively convenient; he expects government or some other agency to find the solutions to his problems. We live in an era of self-induced disease."

LeRiche is convinced that society today is too affluent, cosseted and unenterprising — and moreover that it is inexorably headed toward either anarchy or Fascism. If physicians want to be involved in preventive measures, he says, they must not only be competent scientifically, and as educators of the public, but they must fully understand changing social and politi-

myths, and realities of health maintenance

cal attitudes in the world in order to look after people.

As LeRiche sees it, one of the more vital factors in preventive medicine is nutrition. In general, he says, physicians know practically nothing about nutrition, and yet one of the major health problems in the next few years will stem from malnutrition — from either lack of food or, in the de-

veloped countries, lack of knowledge about what foods are nutritious.

LeRiche is concerned that it's the poor who suffer most in the so-called affluent nations because they buy ready-to-cook dinners and prepackaged food — and need advice from physicians about balanced diets and sensible eating habits. But the middle and upper classes, he contends, often need

help too because while good food improves general levels of health, the wealthier often eat too well. Their diet frequently contains dangerously high levels of animal fat.

Chemical manipulation of food is another health-and-politics subject that has captured Harding LeRiche's attention. "It has a far greater effect than people believe," he says. "We

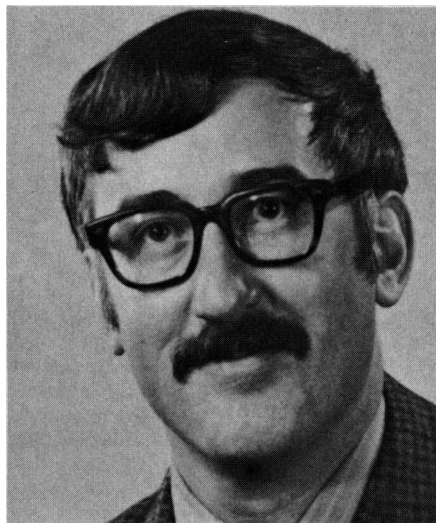
"the present epidemic of myocardial infarction may be due to the combined effect of atherosclerotic ischemia and an abnormally vulnerable myocardium." He says that while the atherosclerotic component is probably related to the high-fat, high-sugar diet of the affluent, the myocardial disorder may be largely the result of modern food technology causing a decline in the ratio of antioxidants to polyunsaturated fatty acids.

Anderson says that even such apparently innocuous procedures as heating corn oil in air to purify it produces such a loss of antioxidants that if the oil is then fed to pigs the animals develop an acute and fatal myocardial degeneration. He says that the "refining" of bread with oxidizing agents has virtually removed this staple food from its role as a source of dietary antioxidants. And, referring to a study comparing Irish immigrants in the Boston area with brothers who had remained in Ireland, Anderson says the higher incidence of ischemic heart disease found in the immigrants was finally attributed to different levels of physical activity in the two groups. However, the *Lancet* article notes, one of the dietary features found to be different (but which received no subsequent comment) was that the men in Ireland had substantially higher intake of whole grain cereals.

Asked if he would favour providing family physicians with crash courses on nutrition, Harding LeRiche was uncharacteristically equivocal: "Yes, but I'm not sure what you'd teach them, except that people can get along on less food, more intelligently chosen and balanced".

Turning to exercise as a factor in preventive medicine, LeRiche said that people who exercise won't necessarily live longer — but they'll live better: they'll feel better and sleep better. And after all, he says, "what's the point of having people hanging around until they're 100 if they're miserable?"

Meanwhile, back at the political imperative, he observes that our society is a lazy one: people watch sports rather than playing them; he is alarmed



"The consumer isn't interested in doing anything for his health that requires discipline; he expects government or some other agency to find the solutions . . ."

LERICHE

"In the hodgepodge of preventive medicine activity some work is being carried out in the absence of evidence that it benefits patients."

SACKETT

don't know what we're putting into food — or what we're taking out of it."

One researcher in the school of hygiene, Dr. T. W. Anderson, asserts that the removal of antioxidants from food has a direct link to increases in ischemic heart disease.

In an article in *The Lancet* (Aug. 11, 1973) Anderson concludes that

AGE	10 to 20	21 to 30	31 to 40	41 to 50	51 to 60	61 to 70 and over
HEREDITY	No known history of heart disease	1 relative with cardiovascular disease Over 60	2 relatives with cardiovascular disease Over 60	1 relative with cardiovascular disease Under 60	2 relatives with cardiovascular disease Under 60	3 relatives with cardiovascular disease Under 60
WEIGHT	More than 5 lbs. below standard weight	-5 to +5 lbs. standard weight	6-20 lbs. over weight	21-35 lbs. over weight	36-50 lbs. over weight	51-65 lbs. over weight
TOBACCO SMOKING	Non-user	Cigar and/or pipe	10 cigarettes or less a day	20 cigarettes a day	30 cigarettes a day	40 cigarettes a day or more
EXERCISE	Intensive occupational and recreational exertion	Moderate occupational and recreational exertion	Sedentary work and intense recreational exertion	Sedentary occupational and moderate recreational exertion	Sedentary work and light recreational exertion	Complete lack of all exercise
CHOLESTEROL OR FAT % IN DIET	Cholesterol below 180 mg.% Diet contains no animal or solid fats	Cholesterol 181-205 mg.% Diet contains 10% animal or solid fats	Cholesterol 206-230 mg.% Diet contains 20% animal or solid fats	Cholesterol 231-255 mg.% Diet contains 30% animal or solid fats	Cholesterol 256-280 mg.% Diet contains 40% animal or solid fats	Cholesterol 281-300 mg.% Diet contains 50% animal or solid fats
BLOOD PRESSURE	100 upper reading	120 upper reading	140 upper reading	160 upper reading	180 upper reading	200 or over upper reading
SEX	Female under 40	Female 40-50	Female over 50	Male	Stocky male	Bald stocky male

This is the core of Risko, the heart-attack game published by the Michigan Heart Association. Participants are urged to study each line and circle the number applicable. Then they add them up. There are five degrees of risk — 6-11 points means risk well below average. 12-17 equals below average; 18-24 means an average risk. Players 25-31 have a moderate risk, those with 32-40 have a risk at a dangerous level, while the winners are those 41-63 (danger urgent, see your doctor now). The chart does not take into account hard-to-measure factors such as diabetes, gout or ECG irregularities. And the association stresses the game is not a medical diagnosis — just a highlighting of what the risk factors are.

that the Canadian government is importing Mexican workers to harvest tobacco and vegetables, while farm labourers in New Brunswick are on welfare because they can't find jobs. We've reached a point, he observes, where there are many jobs that Canadians simply won't do — and the government pays them more not to work. LeRiche notes that the only thing that will really make people move themselves is the thought of making money. But if they're offered the same, or more, money for doing nothing they'll take it.

LeRiche's office, in the ivy-covered school of hygiene building at the University of Toronto, is crammed with books; most are medical, some are on engineering and philosophy.

He refers to "Future Shock" and "The Greening of America." I light a

cigarette and am politely asked if I cough up sputum.

"You will, eventually," he says. "And then you'll get the rasping voice, shortness of breath, emphysema possibly — maybe even lung cancer." Preventive medicine is clearly a full-time job, and probably extremely frustrating.

We return to exercise, and he ponders my point that it is so often masochistic and boring. I mention the Aerobics Institute in Dallas where a self-righteous, fitter-than-thou atmosphere prevails; where the missionaries of exercise endlessly measure and prod their plumper and more breathless brethren. Can we take a less puritanical approach to exercise? LeRiche isn't sure. The more weak-willed among us are always more difficult to fit into a grand scheme of things.

And exercise isn't the only area of

preventive medicine to have religious overtones. The whole matter of child rearing — right from neonatal care on — generates Jesuitical fervor. LeRiche is enthusiastic about the return to breast feeding. Artificial foods are good, he says, but not good enough. Breast feeding is not only satisfying for the mother, but it provides greater immunity to the child. Some immunologists, he says, have expressed the view that early introduction to cow's milk makes children much more susceptible to allergic problems.

On immunization — the most obvious form of prevention — LeRiche believes that we're slacking, particularly so far as smallpox is concerned. He says that it's easy to introduce smallpox into Canada, particularly in view of increased travel and the large numbers of immigrants.

In the Sunnybrook Hospital survey, which Dr. LeRiche and a team of investigators conducted in 1972 into patterns of health care in suburban Toronto, one of the findings was the low percentage of children who had been immunized against smallpox. This, he says, despite the fact that the Canadian vaccine — in comparison with the British and Dutch versions — is particularly good.

In the U.S., says LeRiche, there's a "go slow" on smallpox immunizations, and he believes that as a result the disease will return. Moreover, he says, many people come into Canada who haven't been immunized against diphtheria and "I expect to see an increasing incidence of this disease." He also sees evidence of increasing importation of tropical diseases — amebiasis, worm parasites — and a renewed increase in TB. The medical profession, he says, should make it its business to find out where patients come from, and government health departments should develop strong programs of public education; not only that, he says, but the Canadian Medical Association should give thought to what its American counterpart has done, and produce some kind of health publication for the general public.

As a general principle, though, LeRiche isn't in favour of the earnest, public-service approach to preventive medicine education. He favours involvement in seminars on cancer or heart disease, and believes in the Marcus Welby brand of imparting medical information: sugaring the pill.

LeRiche believes regular medical checkups are expensive and time-consuming — and that the wrong people usually have them. He doubts the worth of annual checkups for younger people but thinks that men over 40 should be checked regularly,

and that women should undergo regular examination for cancer of the breast and cervix. The important thing, he says, is that the checkup must be absolutely comprehensive — and conducted by one physician, preferably a family doctor. Men over 40, especially those with a family history of a particular disease, should avail themselves of preventive care.

LeRiche emphasizes the importance of sticking with one physician, if it can be done; a doctor who knows the family background, economic circumstances, and emotional and environmental factors. Doctors, he says, should have a comprehensive understanding of the risk factors.

Another major area in preventive medicine is population increase. This whole problem, says LeRiche, is going to hit the world very hard in the next few years. Slipping again into political gear, he notes that people have blithely assumed that world food supplies will keep pace with population growth. And yet, he says, there's one acre of arable land and six acres of pasture per person in the world; productivity on this land has to be significantly increased — and there's a limit to how much it can be increased. India, he believes,

"The greatest empty space in this country is in the heads of those who believe that there's a great deal of empty space in this country.."

is in worse shape from this point of view than it was 20 years ago, with a population growing at the rate of 15 million a year. Moreover, LeRiche warns, Canada can't absorb the overflow from other countries as many have suggested. "The greatest empty space in this country is in the heads of those who believe that there's a great deal of empty space in this country."

The answer, therefore, lies in contraception. And this, in Harding LeRiche's view consists of infinitely more than handing out condoms to the natives. He believes that we're involved in a ridiculous dichotomy in this country; condoning the murder of unborn fetuses with more liberal attitudes to abortion while, at the same time, engaging in "heroic efforts" to save the lives of potential retardates. He believes that money should be withdrawn from intensive efforts in the neonatal ward — which, he says, do little more

"People who exercise won't necessarily live longer — but they'll live better . . . what's the point of having people hang around until they're 100 if they're miserable?"

than bolster the physician's ego, anyway — and concentrate on programs to people about zero population growth.

LeRiche believes that one of the reasons a lot of kids don't use contraceptives is precisely because they've been conditioned to accept that, if they do get pregnant, they can have an abortion, anyway. This society he says, "so tolerant of crooks and murderers, condones abortion."

So far as the developing countries are concerned, the answer to contraception, he believes, lies in "educating the women. Women — ideally midwives — talking to other women is the solution." People in Canada have no idea, he says, of how rapidly populations are expanding in the developing nations. Doctors have to rethink their attitudes and get away from the concept that it's enough to save a life; they must ask themselves what's going to happen to that life.

Turning to a favourite theme, ecology, LeRiche points out the developed countries lack energy; the underdeveloped lack food. But, he says, Canada can't grow adequate food supplies without energy — oil. "We're into a straight situation of people versus natural resources — and I'm damn sure the Canadian government hasn't got that into its head yet".

In the final analysis, Harding LeRiche believes that the basis for preventive medicine is people fending for themselves. Socialism can't work in the health field or any other, he says, if people are lazy and uncooperative.

* * *

Dr. David Sackett, professor of clinical epidemiology and biostatistics at McMaster University, agrees with LeRiche . . . up to a point. Sure the individual bears responsibility for his health, he says, but very often there's not a great deal he can do about it.

Take Risko, for instance. What can the individual do to counteract the factors listed? Sackett asks. He can't alter his age; he cannot rearrange heredity; in most cases, there's not too much to be done about one's sex,

either. Lowering blood pressure, while of great benefit in preventing many disorders, does not lower the risk of heart attacks. That leaves weight, diet, exercise and cigarette smoking. And, while Sackett acknowledges that these are areas in which the situation can be changed, he cautions that we really don't know enough about exercise and diet. On smoking, he is far less equivocal: he regards the habit as "ethical suicide".

If one defines efficacy as that which does more good than harm, he says, I'm not at all sure that I'd define Risko as efficacious.

Sackett is especially forthright on the periodic health examination. He agrees with LeRiche that patients who seek out preventive health care, as opposed to episodic disease care, are usually not the ones at highest risk. They are usually from higher socioeconomic groups, and have a "volunteer" attitude. Where Sackett and LeRiche part company, though, is in the fact that fussy spots and hypochondriacs are, in Sackett's view, sick people who need medical care.

Sackett sees several reasons why asymptomatic people submit themselves for examination. Insurance is a major spur for the checkup, but it

"If you're not prolonging life forward in time, but prolonging the disease backward in time, I can see no worth in devoting time to preventive medicine"

has to do only with risk, not cause or cure. Then, says Sackett, "there are industrial and government checkups for certain kinds of jobs, for immigration and so on. You don't want uncontrolled epileptics running heavy industrial machinery; you can't have immigrants bringing TB or cholera with them. So these people have to be weeded out through a 'preventive medicine' process."

Sackett believes strongly, as does LeRiche, in the importance to preventive medicine of the patient dealing with one clinician. If he sees one physician when he, the patient, is well, that physician will be able to pinpoint biochemical, physiological or behavioural changes from the "norm", although Sackett is quick to point out that one of the problems for the MD who wants to become involved in preventive medicine is that of defining the normal.

weight change no problem with **DIAβETA**

Composition: Glyburide 5 mg. **Indications:** Uncomplicated diabetes mellitus of the stable, mild, non-ketotic, maturity-onset type not controlled by diet alone, in patients who have failed to respond to or cannot be maintained on other sulfonylureas. **Contraindications:** Severely brittle and juvenile diabetes, severe ketosis, acidosis, coma, thyrotoxicosis, frank jaundice and liver disease, severe renal impairment, severe infections, trauma, surgery, pregnancy and pre-existing complications peculiar to diabetes. **Precautions:** Careful selection of patients is important. It is imperative that there be rigid adherence to diet, careful adjustment of dosage, instruction of the patient on hypoglycemic reactions and their control and regular follow-up examinations. Administer with or immediately after a meal; lunchtime for patients eating a light breakfast. Periodic liver function tests, peripheral blood counts and ophthalmic examinations are advisable. The possibility of hypoglycemia should be considered when certain long-acting sulphonamides, tuberculostatics, phenylbutazone, monoamine oxidase inhibitors, coumarin derivatives, salicylates, probenecid or propranolol are administered simultaneously. Use sedatives cautiously in patients receiving oral hypoglycemic agents since their action may be prolonged. The effects of oral hypoglycemic agents on the vascular changes and other long-term sequelae of diabetes are not known; patients receiving such drugs must be very closely observed for both short- and long-term complications. Intolerance to alcohol rarely occurs. Administer oral hypoglycemic agents with caution to patients with Addison's disease. **Adverse reactions:** Allergic skin reactions including photosensitivity, pruritus, headache, tinnitus, fatigue, malaise, weakness, dizziness have been reported in a small number of patients. Hypoglycemic reactions are infrequently observed. Thrombocytopenia is uncommon. **Overdosage:** Symptoms: Manifestations of hypoglycemia include sweating, flushing or pallor, numbness, chilliness, hunger, trembling, headache, dizziness, increased pulse rate, palpitations, increase in blood pressure, apprehensiveness and syncope in the mild cases. In the more severe cases, coma appears. **Treatment:** Administer dextrose or glucagon and dextrose. **Dosage and administration:** Total daily dosage ranges between 2.5 and 20 mg. 1. Newly-diagnosed diabetics: Initial dosage is 5 mg daily (2.5 mg in patients over 60 years of age) for 5 to 7 days. Adjust dosage by increments of 2.5 mg according to response. The maximum daily dose of DIAβETA is 20 mg. Most cases can be controlled by 5-10 mg daily given as a single dose during or immediately after breakfast. 2. Changeover from other oral hypoglycemic agents: Discontinue previous oral medication and start DIAβETA 5 mg daily (2.5 mg in patients over 60 years of age). Determine maintenance dosage as in newly-diagnosed diabetics. 3. Changeover from insulin: Less than 20 units daily — discontinue insulin and start on DIAβETA 5 mg daily (2.5 mg in patients over 60 years of age). Adjust dosage according to response. Between 20-40 units of insulin daily — reduce insulin by 30-50% and start DIAβETA 2.5 mg daily. Further reduce insulin and increase DIAβETA dosage according to response. 4. Combined treatment with biguanides: If adequate control becomes impossible with diet and maximum doses of DIAβETA (20 mg daily), control may be restored by combining with a biguanide. Maintain DIAβETA dosage and add 50 mg of phenformin. 5. Combined treatment with insulin: Patients with (relative) insulin resistance can occasionally be more smoothly controlled by adding DIAβETA. **Supply:** White, oblong, scored 5 mg tablets Code (LDI) in boxes of 30 and 300. Product Monograph on request.



Hoechst Pharmaceuticals, Division of Canadian Hoechst Ltd., Montreal 383

Reg Hoechst TM

1065/7083/E

Sackett makes an interesting point about what he calls "regressing towards the mean". If you measure a group of people in whom some show evidence of high blood pressure, subsequent measurement will reveal greater numbers moving toward normal levels. The reason for this is that there is variation in individual showing for this and other tests.

There is a problem, says Sackett, in determining what is normal. Using the example of blood pressure he says that 10 years ago "normal" blood pressure went up as high as 110; more and more experimental evidence suggests that lower and lower elevations of blood pressure if reversed prolong life. "Normal" blood pressure is different now; it benefits the guy with 95 if you lower it. From the preventive medicine point of view, he says, the definition of normal is "the normal range at the point beyond which intervention of some sort begins to do more good than harm".

The danger as Sackett sees it, is that in the "hodgepodge of preventive medicine activity" some work is being car-

"... trouble is, though, we're sitting on our hands so far as certain cause and effect situations, clearly documented, are concerned"

ried out in the absence of evidence that it benefits patients — and even in direct contradiction to the patient's interests. At the same time, we're ignoring some preventive procedures the efficacy of which is well-established.

As an epidemiologist who, like Le-Riche, sees patients, Sackett takes a pragmatic view. He realizes that effective prevention takes time and money. The practising doctor can't "look at everybody for everything" — it would simply be impossible. That's why Sackett is an advocate of identifying the patient at risk, and going to work on him.

So far as public health education programs are concerned, Sackett is far from enthusiastic; in fact, he says, there's not much evidence that people's health habits can be significantly altered. School children don't respond to anti-smoking propaganda, he says, and "folks are willing to take risks with their health that are fairly great if they think the likelihood of their being affected is not too great."

Sackett is "sceptical" about public health education in nutrition because he wonders about the validity of the existing information base. He also wonders about the "dangers" of mild to moderate obesity and fatty diets.

One of the clearly established risk factors — much more than diet or exercise, says Sackett — is hypertension. But he points out that when we analyze the usefulness of reducing high blood pressure in coronary-prone men, we find that lowering blood pressure does not lower coronary risk. It does reduce risk in stroke, heart failure, retinal and renal degeneration. But the risk of myocardial infarction is virtually unchanged. "So we must know what we're talking about in finding predictors."

Says Sackett: "People feel that we should be making massive attacks on various 'preventable' disease areas; trouble is though, we're sitting on our hands so far as certain cause and effect situations, clearly documented, are concerned — and moving off in all directions to attack health problems where there's no consensus about their cause."

One area in which there's no doubt, says Sackett, is smoking. "It seems to me highly inappropriate that the Canadian government holds the attitude it does about the growth, manufacture and sale of cigarettes; we have as good information about the risk of lung cancer associated with cigarettes as we ever will have about anything of that nature. We're spending vast amounts of money — government money — on health education programs while ignoring this one... the evidence is incontrovertible that cigarettes are dangerous; I think the evidence is highly equivocal whether, say, jogging is good for health."

What kinds of approach would Sackett take to public health education? "I am insufficiently convinced that funds spent for health education programs wouldn't be better spent on programs that would bring the arts to the public," he says.

In any case, Sackett believes that the present health structure — hospitals, physicians' offices and so on — "does not have as profound an effect as factors lying outside the system on the health of the general population... the factors affecting health tend to lie outside the system: social, economic, family and government."

Sackett is especially concerned that physicians and patients understand what preventive medicine is *for*. He points out that there's absolutely no point in diagnosing disease earlier if you can't do anything about it. "If

you're not prolonging life forward in time, but prolonging the disease backward in time," he suggests, "with the exception of helping people plan their lives if their lives are going to be quite substantially shortened, I can see no worth in devoting clinical time to it."

Nonetheless, Sackett believes that the family doctor is already doing "an enormous amount" of worthwhile preventive medicine. The College of Family Physicians, the Society of Teachers of Family Medicine, and individual practitioners, he says, are trying to set up patterns of clinical judgement for assessing existing evidence for taking certain clinical actions, a methodological approach to what should and should not be done. In other words, some attempt is being made to veer away from the "rela-

tively haphazard" system in which everybody comes into the physician's office for a checkup once a year.

The family doctors and their representative bodies are more and more realizing the importance of a cooperative approach — as Sackett puts it: "the doctors out in the real world working on the whole man with the epidemiologists and the methodologists."

Many GPs are "homing in" to specialized subgroups within their own practice for whom preventive medicine is of demonstrated value: going after the kids aggressively for immunization, and to check their vision and hearing; properly evaluating the pregnant women; periodically checking the middle-aged person for high blood pressure, rather than "sticking a sigmoidoscopy

up him, getting a GI series and doing all kinds of graphs, etc."

The selective approach to preventive medicine, Sackett urges, is called "prescriptive screening". In essence it means focusing on the groups where there's a demonstrated payoff — and not simply for early diagnosis but for follow-through. Finding the patient with hypertension is one thing, says Sackett, but persuading him to continue taking the drugs prescribed for it is entirely another.

In all the shrillness about preventive medicine, it is refreshing to find the realism and pragmatism of these two epidemiologists — albeit a realism tinged with some pessimism about prevention. If it's any encouragement to them, this author quit smoking about halfway through writing this piece.

Non-smokers numbers gaining, suggest DNH&W statistics

Statistics on Canadian smoking habits* up to December 1972 reveal a steady increase in the percentage of non-smokers, mainly attributable to adult males' stopping and to a lesser extent adult females.

The statistics released recently by Health and Welfare Minister Marc Lalonde indicate the overall increase in the proportion of Canadians who do not smoke was achieved despite a sharp increase in smoking by teenage girls. There was a levelling off of smoking among teen-age boys.

Only two out of five Canadians 15 years of age and

over smoke cigarettes regularly. It is estimated that there are almost half a million fewer cigarette smokers in Canada now than there would have been if 1965 rates had continued.

There are considerable variations among regions. The greatest increase in the non-smoking population is found in Ontario and British Columbia and the least in Quebec, which has the heaviest smoking pattern for both men and women. There were decreases in the percentage of regular cigarette smokers 15 years and over among males of all regions, and among females in Ontario and British Columbia. There were increases in female smokers in the Atlantic, Quebec and Prairie regions.

*Statistics reproduced in the following tables are based on data collected with the labour force surveys by Statistics Canada.

Table 1—Percentage of non-smokers in the population 15 and over, by sex and by age group, Canada, 1965, 1970, 1972

Sex	Age group	1965	1970	1972	Difference	
					1965-70	1965-72
Both sexes	Total 15 and over	50.2	52.9	53.6	2.7	3.4
	15 — 19	68.9	65.1	63.0	-3.8	-5.9
	20 — 24	42.6	46.0	47.7	3.4	4.8
	25 — 44	42.1	45.7	47.4	3.6	5.3
	45 — 64	48.1	52.5	52.7	4.4	4.6
	65 and over	66.8	70.3	71.4	3.5	4.6
	Total 20 and over	47.2	51.0	52.0	3.8	4.8
Males	Total 15 and over	34.8	41.1	42.6	6.3	7.8
	15 — 19	60.3	59.1	59.3	-1.2	-1.0
	20 — 24	30.4	38.0	39.4	7.6	9.0
	25 — 44	27.8	34.8	37.0	7.0	9.2
	45 — 64	30.1	38.4	39.4	8.3	9.3
	65 and over	42.3	49.2	51.5	6.9	9.2
	Total 20 and over	30.6	38.1	39.8	7.5	9.2
Females	Total 15 and over	65.3	64.5	64.3	-0.8	-1.0
	15 — 19	77.8	71.3	67.0	-6.5	-10.8
	20 — 24	54.4	54.2	55.5	-0.2	1.1
	25 — 44	56.1	56.6	57.7	0.5	1.6
	45 — 64	66.2	66.1	65.5	-0.1	-0.7
	65 and over	88.8	87.9	87.8	-0.9	-1.0
	Total 20 and over	63.4	63.5	63.9	0.1	0.5

Table 2—Percentage of non-smokers in the population 15 and over, by sex and by region, Canada, 1965, 1970, 1972

Sex	Region	1965	1970	1972	Difference	
					1965-70	1965-72
Both sexes	Canada	50.2	52.9	53.6	2.7	3.4
	Atlantic region	52.8	53.4	55.0	0.6	2.2
	Quebec	44.5	46.4	46.2	1.9	1.7
	Ontario	51.6	56.1	56.4	4.5	4.8
	Prairie region	54.4	56.3	57.4	1.9	3.0
	British Columbia	52.5	54.5	56.5	2.0	4.0
Males	Canada	34.8	41.1	42.6	6.3	7.8
	Atlantic region	36.1	39.7	42.8	3.6	6.7
	Quebec	25.4	31.9	33.1	6.5	7.7
	Ontario	36.9	45.0	45.1	8.1	8.2
	Prairie Region	41.4	46.8	49.2	5.4	7.8
	British Columbia	42.6	45.3	49.1	2.7	6.5
Females	Canada	65.3	64.5	64.3	-0.8	-1.0
	Atlantic region	69.1	66.9	67.1	-2.2	-2.0
	Quebec	63.1	60.4	58.8	-2.7	-4.3
	Ontario	65.9	66.8	67.4	0.9	1.5
	Prairie region	67.6	66.0	65.7	-1.6	-1.9
	British Columbia	62.3	63.6	63.9	1.3	1.6